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ABSTRACT

The purpose of the study was to observe the extent to which preschool children's actions were guided by private speech utterances in free play and puzzle solving conditions. A second purpose was to examine how the structure of private speech utterances varied according to the context in which they were uttered. Fifteen preschoolers were videotaped under both conditions. Comparison hypotheses were tested with the Wilcoxon Signed Rank Test. The hypothesis of independence was tested with the Spearman Rank Correlation Coefficient. Analyses suggest that most of the children's actions under both conditions were not guided by their private speech utterances. No significant relationship was found between success on the puzzle task and the amount of task relevant utterances generated while doing the puzzle. Results also indicated that private speech is largely predicted. (Author/MP)

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The Functions of Private Speech in Preschool Children

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The Functions of Private Speech
in Preschool Children

The problem being examined in this study has been debated by philosophers and psychologists for many years: the extent to which language guides action. This question will be explored by examining how preschool children use speech-to-self to guide their action in different contexts, e.g., free play and a problem-solving situation. In the course of this examination we will also look at the extent to which the syntactic structure of the subject and predicate of the private speech utterances vary in the puzzle and play contexts.

Vygotsky's research (1962) provided the impetus for examining private speech's role in guiding young children's actions. He stated that the various stages of speech-to-self attest to a developmental continuum; whereby private speech, in the form of inner speech, is driven underground and becomes thought. He also hypothesized that private speech utterances become, with development, more abbreviated and dominated by the predicate of the utterance.

A.R. Luria's (1961) research examined the extent to which young children, from one to five years old, used private speech utterances to guide their actions in a cognitive task. His results suggest a developmental continuum beginning with children's private speech utterances <u>accompanying</u> actions in a cognitive task. Then, as children develop, private speech utterances begin to <u>precede</u> actions, thereby guiding, he proposed, the young children's actions.

Kohlberg, Yaeger, and Hjertholm's (1968) findings are similar in that they found a curvilinear relationship between age and the amount of private speech generated in a cognitive task. Private speech in older preschoolers also tended to preceed actions in a jigsaw puzzle task.

Speech-to-self in the youngest children, in the above cited research, was overt and not found to be relevant to the cognitive tasks in which they were engaged. As children developed, however, private speech utterances became more task relevant while at the same time becoming more covert. This seems to be what Vygotsky and Mead meant when they stated that thought is internalized speech.

The next area that will be examined, the structure of the speech-to-self utterance, again was due to Vygotsky's (1962) seminal work. He stated that private speech utterances contain the psychological predicate of an idea. Wertsch (1977) and Chafe (1970; 1972) state that syntactic structure varies with semantic intent. They state that the predicate of an utterance often contains information that is being introduced for the first time, or is considered as most important by the speaker, i.e., the new information of the utterance. The phenomenon of new information taking on structural form in the utterance, i.e., the psychological predicate, was discussed specifically by Vygotsky with reference to private speech:

> it shows a tendency towards an altogether specific form of abbreviation: namely omitting the subject of a sentence...while preserving the predicate... we must assume it to be the basic syntactic form of inner speech (cited in Wertsch, 1977, p. 2).

For purposes of the particular topic of this paper, private speech in context, we will look at the structure of the utterance as a reflection of the speaker's knowledge. Chafe (1972) has stated that an utterance's syntactic structure and its semantic intent are interdependent. Syntax varies with meaning. Given this hypothesis it is hoped that one can gain insight into the semantic intent behind an utterance by examining the utterance's syntactic structure.

Based on previously cited research (Kohlberg et al, 1968; Vygotsky, 1962; Luria, 1961) one would hypothesize that syntactic structure would vary with the context in which utterances are generated. This research saw children using language to guide their actions in contexts which were cognitively demanding.

Self-guiding private speech utterances were said to be dominated by the psychological predicate of the utterance. Thus the interrelationship between context and syntactic structure is hypothesized.

Examination of the various <u>contexts</u> of overt private speech, should provide insight into the cognitive processes of the young child in these contexts. It is hoped that the interaction between the context and the utterances examined, as evidence by varying structures and contents of the private speech utterances, will provide some clues as to the cognitive processes used in various contexts.

More specifically stated, three main hypotheses were posed.

<u>Hypothesis 1a</u>: More self-guiding task relevant utterances (TR2) will be elicited by the puzzle condition than by the play condition.

<u>Hypothesis 1b</u>: The puzzle condition will elicit more TR2 utterances than task relevant utterances generated before the initiation of an action (TR1).

Hypothesis 1c: The play condition will elicit more task relevant utterances (TR) than task irrelevant (TI) utterances.

Hypothesis 2: Private speech utterances generated in the puzzle task will be predicated.

Hypothesis 3: A positive relationship is predicted between the number of TR utterances generated in the puzzle task and success on the puzzles.

Method

A sample of fifteen preschoolers was chosen from three eastern Connecticut preschools. Thirty permission forms were distributed in the three centers, and twenty-five were returned. From this pool of twenty-five children, fifteen children were randomly chosen to form a sample of nine boys and six girls.

The children's ages ranged from forty-four to sixty-five months with a median age of fifty-six months. Subjects were middle class children whose parents worked and paid for their children's day care expenses.

The composition of the sample obtained from the three centers was as follows:

Table 1
Sample: By Age and Sex

Sex	Number	Median Age (in months)
Male	9	58
Female	6	53
Total	15	56

The children were observed and videotaped in both morning and afternoon sessions in their usual classrooms. All children were exposed to both free play and puzzle conditions; the order of presentation was randomly assigned. Children were accustomed to the presence of videotape equipment in their rooms.

An observation instrument designed for this study was used to describe the dependent variable, private speech, produced in both free play and puzzle conditions. The independent variables are the free play condition and the puzzle condition. Hypotheses 1 and 2 were tested by comparing the total number and the content of the utterances observed under both free play and jigsaw puzzle condition. Hypothesis 3 was tested by comparing the number of task relevant utterances elicited under the puzzle condition with the children's ability to solve any combination of the three jigsaw puzzles that were available. Success on the puzzle(s) was judged by ranking, on an ordinal scale, the portion of the total puzzle(s) completed. Children piecing together 100% of the pieces were assigned a score of 5; children completing 75% were assigned a 4; children completing 50% were assigned a 3; children completing 25% were assigned a 2; children completing less than 25% were assigned a rank of 1.

The children's behavior and language were recorded with a Sony-matic Portable Videocorder. As recommended by Slobin (1967), this data source was supplemented by the experimenter whispering what the child uttered into a separate recording device, a Bell and Howell Educator Model cassette recorder with a Sony Cardioid microphone.

Specifically, in the fifteen minute free play condition, the children were recorded with the video-tape recorder, while the experimenter softly repeated the subject's utterances into the microphone. The experimenter also operated the videotape recorder under this condition. During the puzzle task, the videotape recorder was placed so as to best record the children's movements and language. The experimenter sat about five yards from the children and whispered their utterances into the microphone. At the end of each day, the tapes were transcribed. All data were coded and recoded on separate days. The two sets of coding data yielded a reliability coefficient of .78 after they were tested using the ~~Spearman Rank Correlation Coefficient (Siegel, 1956)~~ Pearson's.

The categories, making up the observation instrument, that were used to organize the data under both conditions as follows. The setting in which private speech took place was a preschool classroom under free play or puzzle conditions.

By examining the participants, or children and adults in a setting, we are questioning how members of a particular culture view private speech. Is private speech used or discouraged? Utterance key refers to the intonation of the utterance. Proposition content examines one utterance's relation to prior utterances, e.g., an answer to a question. The new/old information dichotomy asks what part of the utterance contains new information for the speaker. As was previously stated, the predicate usually carries new information.

Means lists the various media of language used, linguistic and extralinguistic. Perhaps the most valuable component in this model as a schema for categorizing language's cognitive dimensions is fit. If

the speaker's utterances are task relevant (TR) with a world-word fit, or actions following utterances, one could hypothesize that the utterances are guiding the action. A world-word fit shows the speaker's intension to execute the act he is talking about. On the other hand, a word-world fit utterance, or utterances following actions shows that language is used only after the act has been executed. The end of the speech event tells us if the speaker was successful in the task undertaken.

Results

The statistical findings on the effects of the free play and puzzle conditions on the generation of private speech utterances by preschool children are presented in this section. The study examined various ways in which private speech was used in each of the specified conditions. Comparison hypotheses were analyzed by a Wilcoxon Signed Rank Test (Hollander and Wolfe, 1973). The independence hypothesis was analyzed by a Spearman Rank Correlation Coefficient (Siegel, 1956). The probability hypothesis was analyzed with a Binomial Test (Hollander and Wolfe, 1973).

The first set of hypotheses, Hypothesis 1, is composed of three sub-hypotheses, Hypotheses 1a, 1b, and 1c. Hypothesis 1a predicted that children would use more TR2 utterances in the puzzle condition than they would use during free play. This comparison hypothesis was tested with the Wilcoxon and was not supported ($p < .271$). No sex differences were found to exist in this result.

Hypothesis 1b predicted that while in the puzzle condition, children would use more TR2 utterances than TR1 utterances. This hypothesis was tested with the Wilcoxon and not supported. The opposite phenomenon was observed; that is, children in the puzzle condition used significantly more ($p < .001$) TR1 utterances than TR2 utterances.

Hypothesis 1c predicted that the free play condition would elicit more TR utterances than TI utterances; TI utterances do not relate to the activity in which the child is immediately engaged in. After being tested with the Wilcoxon, Hypothesis 1c was supported. Significantly more TR than TI utterances were observed during free play ($p < .001$).

Table 2
Summary Table of Results of
Hypotheses 1 and 2

Hypotheses[a]		N[b]	T+[c]	p[d]
TR2 puzzle	TR2 play (1a)	13	55	NS
TR2 puzzle	TR1 puzzle (1b)	12	1	NS
TR play	TR play (1c)	9	117	.001
New info predicate new info subject (2)		13	80	.007

a the hypotheses as they were originally posed
b number of students involved in analysis
c T+ is the Wilcoxon Signed Rank Statistic
d probability level

In summarizing the results of Hypotheses 1a, 1b, and 1c, it can be stated that under both free play and puzzle conditions children used private speech to accompany, not direct their actions. In other words, children used private speech vis-a-vis action only after the action had been initiated. It does not appear that language was used as a signal to initiate action in either condition.

Hypothesis 2 predicted that more new information would be found in the predicate of private speech utterances generated in the puzzle condition than would be found in the subject of private speech utterances observed in the same condition. Hypothesis 2 was tested with the Wilcoxon and supported ($p < .007$). Also, no sex differences were detected in Hypothesis 2. Similar results were found in the free play condition; significantly more of the new information generated was located in the predicate of the utterances observed ($p < .002$).

Hypothesis 3 was posed with the expectation that a positive relationship would be found between the number of TR utterances observed in the puzzle condition and performance on the puzzles. The hypothesis was tested using a Spearman Rank Correlation and not supported. Neither was a relationship found to exist between the number of TI utterances and performance on the puzzles.

Discussion

The purpose of this study was twofold:

1) to examine the extent to which preschooler's private speech guided their actions in two different contexts, free play and puzzle conditions; and

2) to examine how the structure of private speech utterances varied according to the context in which they were uttered.

Hypotheses 1, 2, and 3 were posed to gain a better understanding of the phenomenon of private speech.

The theoretical basis of Hypothesis 1a is found in the works of Behaviorist psychologists (Watson and Hull, in Goss, 1961) and some Soviet psychologists (Luria, 1961). They hypothesized a verbal mediation paradigm which is represented as follows:

stimulus---verbal mediation---response

This paradigm states that language is a cue, or stimulus, for action, mediating between stimulus and response. Similarly, Luria (1961) states that after four years of age, children s actions tend to be controlled by their language. Given this definition of self-guiding private speech, the evidence suggests that the puzzle condition did not generate significantly more self-guiding speech than was generated during free play. Two possible explanations exist for this observation: one, the puzzle did not exert enough "cognitive pull", i.e., the puzzle was not difficult enough to elicit many self-guiding utterances, or, secondly, preschool children's actions, for the most part, are simply not guided by their language. The first explanation

is possible in that a ceiling effect was encountered in the puzzle condition, twelve out of fifteen children successfully completed all three puzzles. However, when one examines those utterance in the instances where a ceiling effect was not encountered, those children who did not experience success on the puzzle(s), one finds that they also did not generate a significantly greater number of self-guiding utterances. The second explanation for Hypothesis 1a then, may be the more plausible: children of this age group do not seem to guide their action with private speech. The data gathered under Hypothesis 1b further clarify this point.

Hypothesis 1b was posed to more closely analyze the amounts of self-guiding private speech within the context of the puzzle condition. It was predicted that the puzzle condition would elicit more self-guiding task relevant utterances than task relevant utterances after action was initiated. The hypothesis was not supported. Indeed, the opposite phenomenon was observed: significantly more task relevant utterances were observed after action was initiated than before action was initiated ($p < .001$). The observation also held true for those children who failed one or more puzzles. In other words, children who were successful as well as children who were not successful in the puzzle condition seemed to use private speech in a similar way--after actions were initiated. We should be able to conclude then, that the puzzle condition did not elicit self-guiding private speech.

The data do not seem to support the Behaviorist notion of a stimulus---verbal mediation---response paradigm being used by most children in working with puzzles. The data do suggest, however, that private speech did not vary randomly under the puzzle condition. This statement is supported by data showing the existence of significantly more task relevant than nontask relevant utterances. In order for the argument to be made that private speech has a cognitive function, that is apart from a self-guiding function, it must be shown that task relevant private speech initiated after an action is begun does have cognitive implications.

Bruner's (1966) and Piaget's (1974, 1976) research seem to provide this explanation. Bruner states that cognition develops along a continuum from enactive to ikonic to symbolic representation. Symbolic representation, for Bruner, occurs when ikonic and enactive representations are encoded into language. The progression toward symbolic development begins, according to Bruner, when the child encodes sensori-motor experiences into a representational medium. Not unlike Piaget (1974), Bruner sees sensori-motor experience as a necessary condition in cognitive development; language does not guide action but encodes it into a more generic medium. Indeed, Piaget (1974) and Bruner (1966) see language itself as an outgrowth of sensori-motor actions.

The data from this study, as analyzed for Hypotheses 1a and 1b, seem to corroborate the Piagetian notion that language is subordinate to action; it evidently follows and does not guide action. Piaget's (1976) most recent work on the topic of action and language suggests

that the young child's verbal encoding of actions help the child become more conscious of his/her actions on objects in the environment. When engaged in complex cognitive tasks the child often encodes actions into a feedback paradigm, encoding each action vis-a-vis the final goal of the task. Piaget states that this checking of individual actions with reference to a goal is a search for equilibrium, each action referring back to the overall goal of the task.

An example of a child using this feedback paradigm of encoding individual actions vis-a-vis an overall goal was provided by a young child in this study while he was doing one of the jigsaw puzzles:

> Wing.
> Where is that other wing?
> Here it is.
> No.
> Hey we need the n'other wing.
> It goes here.
> I got one figured out.

In this example the child explicitly states the goal of his actions; the location of the wing piece of the puzzle. Subsequent to the stating of the goal, individual actions necessary for the reaching of the goal were encoded: the location of the needed piece and the need for a second wing. By encoding the goal and the actions necessary for the reaching of the goal, the child is becoming more cognizant of how individual actions, the means, relate to the total problem, the end. Recognition of the means and the ends of a problem and how they interrelate must be considered in order to solve a complex problem.

Encoding of goals and subsequent actions also provide the child with feedback on the progress being made toward the goal. The above cited example had the child stating a hypothesis; Wing. Where is that other wing? Next the child acted upon the hypothesis; Here it is and then evaluated the action in light of the hypothesis; No. Language, then, seems to be an important aspect of the problem-solving behavior of the young child, even though it does not guide actions, but seems instead to help the child become more cognizant of how individual actions relate to a specific goal.

Hypothesis 1c was posed to examine the effects of a free play condition on the types of private speech generated by preschoolers. The prediction that more task relevant utterances than task irrelevant utterances would be observed was supported. The evidence from this study suggests that play, for the group of children sampled, is task or goal oriented as evidenced by the number of task relevant utterances observed. The evidence clearly shows children using language which reflects children imposing order on their minimally structured environment. The children's play very often followed a theme; such play is labelled dramatic play by Smilansky (1968). For example one child was observed with three other children in a boat-like rocking toy. The language generated by this child shows how she imposed structure on a previously unstructured situation. She constructed a theme of being in a boat fishing. While in the boat she noted a "jellyfish" in the water; the jellyfish in the water was actually a plastic bag on the floor. This example should illustrate that children of this age are capable of redefining the function of an object to fit a constructed play theme.

Evidence illustrating the notion that preschoolers do indeed organize their free play environment toward a specific goal is attested to by the analysis which suggested that a significant number of private speech utterances were relevant to the task engaging the child during the fifteen minute free play period. More specifically, children tended to talk more about the task they were immediately engaged in than about other activities in the room. One could argue that private speech utterances provide some insight into what the child is attending to during free play. Data illustrating the notion that children organize their free play environment were evidenced by the above cited incident involving the child who constructed a fishing theme. She imposed the necessary order on the environment so as to sustain her free play theme. The self-imposed order was further illustrated when she actually changed the socially accepted function of an object, i.e., a plastic bag into a jellyfish, to meet the needs of the play theme. The argument can be made, and is made by Smilansky, that the structuring of a dramatic play episode with language is an example of the child using language to organize the cognitive task of sustaining dramatic play.

Smilansky states that in order to sustain dramatic play the child must draw upon materials from the environment, e.g., the plastic bag, and subordinate those materials to the theme of the play episode, e.g., a fishing trip. This is usually done by children verbally, e.g., Ooo the jellyfish, whereby they define the new function of objects in the course of play. In this way their playmates also are aware of the new function of the objects; thus play will be sustained. Smilansky (1968), Piaget (1962), and Bruner (1966) state that cognitive development is facilitated when the child uses objects in

novel ways. In this way, they argue, children are gradually moving towards representing the object symbolically. In other words, the signifier, or the word jellyfish, is explicitly separated from the signified, or the plastic bag.

Hypothesis 2 was an attempt to identify the structure of preschoolers' private speech utterances by examining the syntactic location of the utterances' "new information". The new/old information data also provide evidence as to how the structure of a sentence reflects a cognitive state; that is, whether the predicate or the subject is stressed in a given context. Hypothesis 2, which predicted that most of the new information of the private speech utterances observed in the puzzle condition would be located in the predicate, was supported. Data from the free play condition also suggest that a significant amount of new information was located in the predicate. These results are consistent with Vygotsky's (1962) hypothesis that private speech is predicated. Descriptively, then, we can state that private speech is largely predicated. The analytical question of how predication relates to cognition still needs clarification.

It has been stated that the new information of an utterance indicates what the speaker considers to be important (Bates, 1976). Thus, if the information most valued by the speaker is located in the predicate of an utterance, and thereby under the influence of the verb (Chafe, 1970), it could be concluded that in private speech, the verb phrase is most valued by the speaker. Chafe (1970) states even when nouns are mentioned in the new information phrases located in the predicate, the primary stress is on the action of verb. Chafe (1970)

hypothesizes that "the total human conceptual universe is dichotomized into two major areas--the area of the verb . . . and . . . the noun (p. 90). He argues that the verb is the central element in that the nature of the verb determines the rest of the sentence. A verb specified as an action, for example, must be accompanied by an agent noun. Thus by examining the private speech utterances, which are predicated, we can gain some insight into what the speaker views as most important in a particular context. When one compares syntactic cues such as predication to detect new information with the child's actions while the utterance is being articulated, one finds the above-mentioned analysis is quite accurate. For example, a young girl, while pasting papers during free play says to herself, Look how much I got. The syntactic analysis would show that look is being stressed in that it is the main verb of the utterance. The child's actions, subsequent to the utterance, of holding up the paper she was pasting and speaking, corroborate the syntactic analysis.

Thus we can conclude that private speech utterances observed in both free play and puzzle conditions are predicated and that the verb phrase in the predicate matches the child's actions on objects. In both conditions, speakers attend closely to a task, be it puzzle or play theme, and verbally encode the actions in the task.

The final hypothesis, Hypothesis 3, which stated that a positive relationship would be observed between success on the puzzles and the number of task relevant utterances generated by each speaker on the puzzles, was not supported. A ceiling effect was encountered under the puzzle condition; only three out of the fifteen children were not

able to successfully complete all puzzles. The three puzzles were all the attempted forty-one times by fifteen children, and only on four occasions were children not completely successful.

Hypothesis 3 was based on findings which reported a relationship between the number of task relevant private speech utterances and success on cognitive tasks in the Soviet and electromyograph literature. This literature states that task relevant private speech aids in problem solving; thus the child who exhibits more of this type of speech should be more successful at solving problems than the child who does not exhibit task relevant private speech. In examining task relevant utterances generated under the puzzle condition in this study, it was found that children seemed to use different strategies in attempting to solve the puzzles. Indeed, two children did not generate any observable task relevant private speech in their successful encounters with the puzzles, whereas another child generated well over 100 task relevant private speech utterances in the course of completing three puzzles. One child actually generated more task irrelevant utterances than task relevant utterances, yet was still successful in solving all three puzzles. If one were to judge the cognitive strategies used by the children in working the puzzles by their private speech utterances, it seems clear that each child used language differently in doing the puzzles. Results of the first set of hypotheses are helpful in that they suggest that children do not seem to use private speech to guide their actions, despite success on the puzzles. Thus one explanation that can be provided for the results in Hypothesis 3 is that all children in this study used a

variety of task relevant speech, self-guiding and not self-guiding, as well as task irrelevant speech in the puzzle condition. In other words, there does not seem to be a relationship between the type or the amount of private speech observed in the puzzle condition and performance on the puzzles.

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